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The International Organization of Legal Metrology

An inter-governmental organisation working towards internationally accepted legal requirements for measuring instruments and procedures

by M. E. Pulvermacher,
Standards, Weights and Measures Division, DTI

A NATIONAL standards institute plays a vital role in the commercial life of any industrial country, and standards have become a linchpin of trade. National standards provide criteria of quality and performance, eliminate the risk of misunderstanding between a customer and a manufacturer, and also—but only to a limited extent—facilitate international trade. Only to a limited extent, because, having been developed in isolation, as it were, one country's national standards differ from those of another, and, in general, the manufacturing country has to conform to the standards of the customer country. To overcome this limitation, national organisations have long been co-operating with the aim of establishing internationally accepted standards enabling every country to work to the same uniform specifications. The production of national standards is a difficult enough job, but the problems of 'harmonising' them into international recommendations are tremendous. Nevertheless, under the co-ordination of the International Organization for Standardization, and the International Electrotechnical Commission, considerable progress is being made.

Metrology is one of the fields in which the problems of standardisation are complicated by the fact that the instruments and procedures covered have often to conform to legal requirements: witness the obligations imposed by the Weights and Measures Act in the United Kingdom. Legislation is the responsibility of governments, and, hence, if international standardisation involves items which are already the subject of legislation in individual countries, agreement can be reached only if the 'harmonisation' discussions are conducted at governmental level. Which leads us to the OIML—the Organisation International de Métrologie Légale.

Aims

The OIML was established in 1955, by an International Convention* to which the United Kingdom acceded in 1962. It is an organisation of governments which any country can join, either as a member with full voting rights, or as a corresponding member with no voting powers. At present it has 37 members (including most of the European countries) and 8 corresponding members. Its overall aims are to resolve the technical and administrative problems inherent in the international use of measuring instruments in fields which are covered by national statutory regulations. The ultimate objective is to promote the international standardisation of measuring instruments and procedures, and hence to facilitate international trade in such equipment and in the products for which the equipment is used. If, for example, a given type of weighing instrument conformed to a recognised international standard, it would be easier to market it in any country recognising the standard, and also to specify it in a contract as a valid means of weighing a product to be exported from one country to another.

OIML's detailed aims, as defined in the Convention, are briefly as follows:

(1) to establish a documentation and information centre;
(2) to translate the texts of legal requirements for measuring instruments and to study how such requirements are applied in different countries;
(3) to determine the general principles of legal metrology:
(4) to study the problems of legal metrology with a view to unifying methods and regulations;
(5) to produce a model draft law and regulations covering measuring instruments, and to draft practical plans for a service for inspecting and checking measuring instruments;
(6) to establish standards to which measuring instruments must conform, so that they can be approved by Member States and recommended internationally.

One aspect of the legal metrology with which OIML is concerned. A special mobile unit tests a road weighbridge in the United Kingdom to establish whether it meets statutory requirements.

OIML's International Recommendations

The agreements arrived at by OIML are published in the form of *International Recommendations* covering the particular aspects of metrology selected for consideration within its

* The original French text of the Convention, and an English translation, have been published by H.M. Stationery Office as *Treaty Series No. 36* (1968), *Command No. 3617*, dated May 1968.

At least once a year in the United Kingdom all petrol pumps are checked for accuracy of measure.

An inspector compares trade weights with his standard weights, and tests a dial scale, in a grocery store.

terms of reference. Though these *Recommendations* are not mandatory, and Member States are not therefore bound to adopt them, Article viii of the International Convention does lay a strong moral obligation on Member States to implement them 'as far as possible'. Inevitably, some of the *Recommendations* will deal with aspects of metrology which are the subject of legislation in some countries but not in others. Clinical thermometers, for instance, have to conform to strict legal requirements in Austria but are not covered by any specific legislation in the United Kingdom. In such a case the Member Country would either introduce amending legislation or, in the absence of legislation, refer the *Recommendation* to its national standards institution or other relevant organisation for preparation of a new or modified standard on a voluntary basis. Here in the United Kingdom all the *International Recommendations* issued by the OIML will be examined, and, wherever possible, Government Regulations or British Standards or other relevant specifications will be brought into line with them.

To date, nineteen *Recommendations* have been published, covering such subjects as weighing-machine weights, non-automatic weighing machines, metering of gas and liquid volumes, clinical thermometers, optical pyrometers, blood-pressure measurement, and reference standards for hardness testing.

OIML's working structure

The OIML operates through the following four constituent bodies:

1. **The International Conference of Legal Metrology.** The International Conference is the governing body of OIML. It meets at least once every six years to decide major questions of policy and to ratify the *Draft Recommendations* prepared by the Working Groups. Each Member State has the right to send a delegation of up to three representatives to the Conference, but the Conference has no permanent members and no permanent President. The last Conference was held in Paris in 1968; the next will be held in London in October 1972.
2. **The International Committee of Legal Metrology.** The Committee has the job of implementing the decisions of the International Conference, and controlling the work of the International Bureau. It usually meets once a year, and each Member State appoints a permanent representative to serve on it. The Committee's President holds office for six years. The United Kingdom representative is Mr. J. D. Platt, Head of SWM3 Branch, Department of Trade and Industry. The current President is Mr. A. J. van Male, of the Netherlands.
3. **The International Bureau of Legal Metrology, 11 rue Turgot, Paris 7.** The Bureau is the permanent headquarters of OIML, and is responsible for co-ordinating the activities of the Working Groups and establishing a reference library covering the metrological regulations obtaining in each country.
4. **Working Groups.** The OIML's Working Groups—there are 68 at present—produce the *Draft Recommendations* submitted to the International Conference. Agreement is reached on the basis of consensus procedures.

DTI's and industry's role

In the United Kingdom the Standards, Weights and Measures Division of the Department of Trade and Industry has the task of co-ordinating the work arising from this country's membership of OIML. It arranges, for example, for the translation of OIML documents from the original French into English, and provides the British Standards Institution, and any other interested party, with originals and translations of most OIML *Draft Recommendations*.

Consultation with industry is generally carried out either through the British Standards Institution, or directly by the United Kingdom representative on the relevant OIML working group, though industry may also, of course, send comments direct to Standards, Weights and Measures Division, Department of Trade and Industry. All views on *Draft Recommendations* are taken into account when a formal reply is sent to the relevant OIML working group or the International Bureau. Translations of *International Recommendations* will be obtainable from the Technology Report Centre, Department of Trade and Industry, Station Square House, Saint Mary Cray, Orpington, Kent.

More information on OIML is available from the Standards, Weights and Measures Division, Department of Trade and Industry, Abell House, John Islip Street, London SW1P 4LN (Tel: 01-834 4422, ext 416). In future, receipt of a Draft Recommendation will be announced in New Technology, with the advice that copies are obtainable from DTI's Standards, Weights and Measures Division.

BSI guide to the use of SI units

PD 5686:1972—*The Use of SI Units*—has been revised by the British Standards Institution to bring it into line with the latest international agreements. The opportunity has been taken also to expand its contents and make it somewhat easier to use. *PD* 5686: 1972 is available from BSI Sales Branch, 101 Pentonville Road, London N1 9ND. Price, including postage, 85p (plus 20p for orders under £2.)

Repairing Slurry Roofs . . .
RAE shows how

In its early days as a roofing material, slate, when cut and trimmed accurately to the shape and dimensions necessary to ensure that individual tiles overlapped correctly to produce a weather-proof and aesthetically pleasing roof, was relatively expensive. So expensive as to put it beyond the reach of many people, who hence had to make do with second best. Second best in this instance was represented by slates cut only very roughly to shape and size, whose dominant characteristic was their irregularity. Any roof tiled with these was bound to have its fair proportion of gaps, and could hardly be described as the ultimate in protection against the elements. To plug the gaps, the builder slapped a coating of cement slurry over the entire slate roof. As new coatings were periodically added to maintain protection, this layer of cement slurry built up to a fair thickness, and in time became virtually a separate part of the roof, supported by the tiles beneath: hence the appellation *slurry-roofed.* Houses with slurry roofs are still numerous in many parts of the UK.

The Problem

A tiler prepared a roof for slating by nailing across the rafters parallel laths of wood ('purlins' the builders call them), each spaced a slate's width from its neighbours and running the length of the roof. Through a hole in each slate was inserted a short wooden peg or a galvanised nail, and the peg or nail was used to hook the slate into position over a purlin, so that it overlapped the slate below and underlapped the one above. A slate roof is therefore held in position solely by the purlins and slate pegs. Since nothing lasts for ever, the pegs and purlins eventually rot and break. If a peg fails, one slate telescopes down on to its neighbour. When a purlin rots, a whole row of slates telescopes down on to the row below, doubling the weight supported by the next purlin. If several purlins go, then the roof could be in danger, since even a sound purlin is unlikely to withstand for long the combined weight of several rows of telescoped slates. In the ultimate, the bottom purlin could well be supporting the entire roof. Many slurry roofs are already in or approaching this condition—virtually on the verge of collapse, just waiting, as it were, for sufficient vibration from a passing lorry. The obvious method of repairing the roof is to remove the slurry, replace the pegs and purlins, re-slate, and build up another slurry layer. But this job would be extremely expensive, slates would be broken, the property would be exposed roofless to the elements during the repair, and, most important of all, the whole exercise would be self-defeating, since the new slurry would almost certainly turn out to be out of keeping with the rest of the house. The point is that a slurry roof has become a desirable feature of old houses, regarded very highly by people looking for a country cottage 'of character'. The owner is hence faced with a dilemma: he leaves the roof untouched, in which case it will eventually collapse; or, at some considerable expense, he repairs it, and, in so doing, entirely destroys its character.

RAE's solution

In an offshoot to their investigations into the effects of vibration on various structures, the Royal Aircraft Establishment, Farnborough, have come up with an answer to this dilemma which any handyman or do-it-yourself devotee will have no difficulty in applying. The solution is simplicity itself—all that is needed is a supply of thin-gauge aluminium angle irons, a pair of snips, a screwdriver and screws. Accepting the fact that the problem could not be approached from the outside of the roof, the RAE decided to attack it from the only other alternative—the inside. They assumed that the rafters would be the soundest part of the structure—sound enough still to provide support for the broken purlins. They could not use the outer face of the rafters (ie, that to which the purlins had been originally nailed) because access was impossible due to the slates resting on it; left with Hobson's choice, they therefore had to use the side face. To provide a new outer face capable of supporting the purlins, they screwed a thin-gauge aluminium angle iron on to the side of the rafter. The protruding side of the angle iron—the new outer face—was then snipped at the locations where the purlins were to be supported, and the aluminium was bent upward at the notches to form a kind of protruding 'saw tooth' into which the purlin could be bracketed and held rigidly in place. New pegs were pushed into the slates needing them, the slates were re-hooked into position over the purlins, and the roof was almost as good as new. The same approach could, of course, also be used to extend the life of any old slate roof—rapidly and at very little cost.

Before and after. Top: Photograph of the inside of a slurry roof, showing how the purlins have broken, and been pushed down the roof as the slates, with no support, 'telescope' together. Bottom: A close-up of the RAE method of repair, in which the thin-gauge aluminium angle irons, snipped and bent upward at the appropriate locations, can be seen supporting the broken purlins.

Surface Coatings for Use under Radioactive Contamination or Exposure

by P. Walker,
Atomic Weapons Research Establishment, Aldermaston

This article is one of a series which we hope to publish on various aspects of AWRE's work in the field of organic protective coatings. In last month's issue of New Technology the author discussed the factors affecting the adhesion of such coatings to metals. In the present article he considers the selection of coatings for use on surfaces exposed to radioactive contamination.

All paint coatings, irrespective of the application involved, have to satisfy certain basic requirements: they have to exhibit good mechanical strength and satisfactory adhesion; they have to confer the desired degree of protection; and they have in most cases to be of pleasing appearance. This statement will come as no revelation, but it does provide a good hook from which to hang my main point: that a coating for radioactive environments requires special consideration. It must not only possess all the basic characteristics of conventional coatings, but also conform to criteria which are peculiar to radioactive service. Given therefore that a coating meets the basic requirements, its suitability for radioactive areas can be assessed in terms of such factors as its absorptivity towards radioactivity, its stability under irradiation, the ease with which it can be decontaminated, its resistance to the effects of decontaminants and its resistance to water. Having said this, I hasten to add that these selfsame properties also make coatings suitable for many other applications. For example, since they have high resistance to contamination and are easily decontaminated, coatings for radioactive environments become obvious candidates for use in hospital wards, operating theatres, food-processing buildings, breweries and the like, and, being highly water-resistant, they could also find application in swimming pools, water cisterns, pumping stations and water tunnels.

The coatings under consideration can be divided into three main categories: those for use in areas exposed to contamination by radioactive substances; those for use under high levels of radiation; and 'metal-free' coatings required in nuclear-power stations of *Magnox* type. The three categories are discussed below.

Coatings for contaminated areas

The overriding requirement here is that the cured coating should absorb the minimum amount of radioactive material during exposure and retain the minimum amount after decontamination: in a word, the coating should be easily decontaminated. The radioactive contaminant may range in form from dry metallic dusts and swarf to concentrated nitric-acid solutions; but, whatever the form, the quantities posing a health hazard are small—for example, it has been calculated that 1 microgramme of P32 distributed over the surfaces of a 3.5-m-square room would be sufficient to render it unsafe. Radioactive contamination may arise by three main mechanisms, depending on the physical form and, if wet, the pH of the contaminant.

Firstly, dry particulate contamination. Fortunately, radioactive dust behaves much like non-radioactive dust, and can be removed by washing with detergents. In most cases, the surface of the coating will have been modified by oxidative degradation, the incompatibility of the coating components and/or contact with airborne greasy matter. Under neutral or alkaline conditions, soluble contaminants will be adsorbed on to such a surface in ionic or colloidal form, and decontamination may be merely a case of removing the surface film with an efficient detergent composition. A smooth, hard, glossy surface will facilitate decontamination.

Secondly, all organic coatings possess surface-active groups, partly due to their chemical composition, and partly to the presence of degradation products. At pH's above 2-3, these surface-active groups ionise, and function as low-capacity ion exchangers, which, if strong enough, will retain considerable amounts of radioactivity. This type of contamination can be removed by treatment with acids, strong solutions of polyvalent ions, or mildly chelating solutions.

The third, and least tractable, contamination mechanism involves penetration of the paint film by the contaminant. The process usually occurs under acidic conditions, and may be regarded as akin to solvent extraction, with the difference that the organic phase is solid. The presence of nitrate solutions is particularly conducive to extraction by the solid phase, and the process is further enhanced by the presence of amino groups and phosphate esters. This type of contamination is usually tackled by solvent washing or prolonged aqueous treatments, though, in extreme cases, it may be necessary to remove the coating completely.

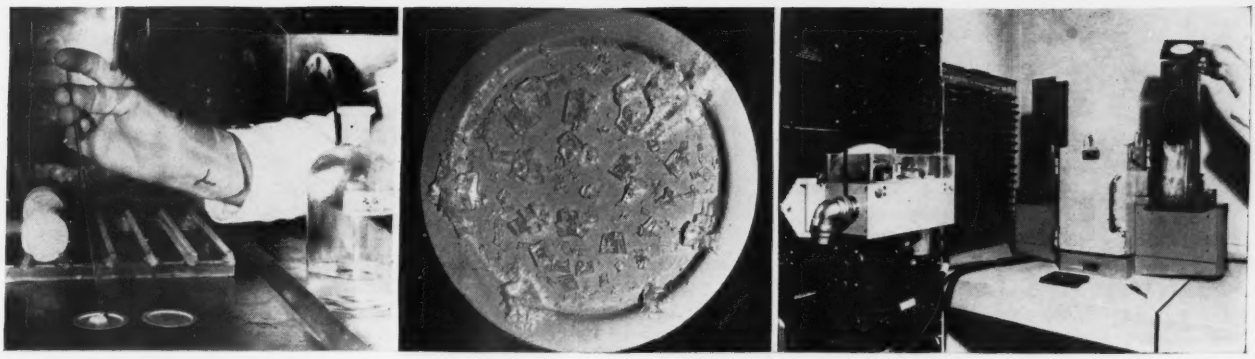
Until recently no standard test was available for assessing the ease with which a coating can be decontaminated, and major users of coatings for contaminated areas have had to

Table 1. Decontamination properties of some surface coatings

Coating	BS 4247	AWRE acidic test
Alkyd (oil-modified)	Fair to good	Fair to good
Tung oil/phenolic	Excellent	Excellent
Vinyls	Fair to good	Poor to fair
Chlorinated rubber	Excellent	Excellent
Polyamide-cured epoxides	Fair to good	Very poor
Amine-cured epoxides	Fair	Poor
Adduct-cured epoxides	Fair	Fair
Aliphatic polyurethanes	Good	Poor to fair
Thermosetting acrylics	Excellent	Poor

Table 2. Deterioration dose of some polymers

Polymer	Approximate deterioration dose (rads)
Cellulose esters	1×10^6
Methacrylate resins	5×10^6
Neoprene	5×10^6
Vinyl acetate	4×10^7
Chlorinated polymers	5×10^7
Catalysed epoxide resins	5×10^8—2×10^9
Polyurethanes	5×10^8—3×10^9
Alkyd resins	5×10^8—1×10^9
Polyesters (unmodified)	5×10^8—1×10^9
Phenolics	1×10^9—5×10^9
Urea formaldehyde resins	1×10^9—5×10^9
Diphenyl silicones	2×10^9—5×10^9



Determining the decontamination characteristics of surface coatings at AWRE. A counting tray is first coated with the formulation under test, and then contaminated (left) with cerium 144 and plutonium 239 in admixture. The contaminated tray after drying out is shown centre. Before and after decontamination treatment the tray is counted for α and $\beta\gamma$, using an α scintillation counter and an automatic $\beta\gamma$ counter (right).

apply their own tests. The present standard test (*BS* 4247: *Part* 1—*The Assessment of Surface Materials for Use in Radioactive Areas*), which was issued by the British Standards Institution in 1967, relies on a mildly acidic contaminant; on the other hand, the test used by the AWRE allows for the specimen surface to be contaminated with either neutral or strongly acidic contaminants. Such differences in methods of testing coatings can lead to difficulties, since the results for a paint tested under neutral or weakly acidic conditions are no reflection of performance if the paint is then used under strongly acidic conditions. Table 1 compares the ease of decontamination of a variety of coatings as determined by the B.S. method and the AWRE acid test. In some cases the two results show a fair degree of agreement, but the assessments for the thermosetting acrylics are totally conflicting.

Decontamination characteristics are influenced by many compositional factors, including the type of resin used, the plasticiser, the solvent mixture, and the type and level of pigmentation. Pigmentation is very important, and ease of decontamination decreases rapidly with increase in pigmentation: hence the choice of glossy, low-pigment coatings, and the avoidance of matt or eggshell coatings. Coatings based on chlorinated rubber and tung-oil phenolic varnishes offer excellent decontamination characteristics, and, if greater chemical resistance is required, adduct-cured epoxide and aliphatic-cured polyurethanes can be used.

Coatings for high-radiation levels

Very little is known of the deterioration suffered by paints (as opposed to unmodified polymers) when exposed to radiation, and even less is known of the radiation resistance of paints when immersed in water—a common environment. The general order of resistance of some polymers under dry conditions is shown in Table 2. In general, aromatic curing agents confer greater stability than those of aliphatic type, and for high-radiation areas cold-curing two-pack epoxide resins are generally used. For a given dosage, radiation causes rather more damage when the coating is exposed under water-immersion conditions.

Table 3. Specification for metal-free paints

Paint	Aggregate of Group 1 metals	Aggregate of Group 2 metals (% max)	Aggregate of Group 3 metals (% max)
Primer	Nil	1.0	3.0
Undercoat and finish	Nil	0.1	1.0

Group 1 Mercury
Group 2 Barium, bismuth, cadmium, gallium, indium, lead, lithium, thallium, tin and zinc.
Group 3 Aluminium, antimony, calcium, cerium, copper, nickel, praseodymium, silver and strontium.
In addition boron should not exceed 50 parts per million.

Metal-free coatings

The so-called metal-free paints are specified for use in *Magnox* reactors, in which magnesium alloys are employed for the outer cladding of fuel elements. The assumption is that, if flakes of paint fall on to the fuel elements, they will be carried into the reactor, and, under reactor conditions, the organic materials (ie, the resinous binder) present in the flakes will burn off, allowing any inorganics present to deposit on the fuel-element surface. The metallurgy of the alloys is such that they can tolerate contact with some elements only in very small quantities, if at all. Hence, if the inorganics include a sufficiently high amount of the undesirable elements, there will be a reaction with the magnesium, and penetration of the cladding could take place, with consequent release of activity. In the 'metal-free' or 'non-obnoxious' paints these undesirable elements are therefore kept below a certain percentage level. The limits imposed are shown in Table 3.

There are, of course, some applications which span two or even all three of the service conditions discussed above—and these conditions are sometimes combined with exposure to severe 'conventional' environments. One could instance in this context the coatings and winding insulation on fuel-element equipment, which spend most of their working life under immersion conditions, and the coatings on the 'coffins' in which radioactive fuel is stored while it decays. The coffins are stored under demineralised water, and are decontaminated after removal, so that the coatings have not only to be radiation-resistant and easily decontaminated, but also tolerant to mechanical abrasion and impact, and capable of withstanding immersion in demineralised water.

Decontaminants

Normal commercially available detergents may be used in decontamination procedures, but care should be taken to ensure that the contamination removed is not redeposited on the cleaned surface. Decontamination materials developed by the United Kingdom Atomic Energy Authority are also commercially available. The range includes the non-ionic detergent/polyphosphate/EDTA composition N10 (pH 9.5) and the anionic detergent/citrate/EDTA composition SDG3 (pH 3.0), both of which are capable of complexing radioactive substances with no risk of redeposition on the clean surface.

More information: Mr. P. Walker, Atomic Weapons Research Establishment, Aldermaston, Reading RG7 4PR. Tel: Tadley 4111, ext 7659.

NDT Centre's Ultrasonic Probe Testing Service

The Nondestructive Testing Centre, Harwell, is offering a probe-beam evaluation service which manufacturers and users requiring uniform testing standards and controlled sensitivity should find of particular interest. For each probe tested the customer receives a report giving details of the test conditions and results, and including quantised facsimile records (*Mufax* plots) showing the strength of the probe's echo signals. The reports provide a record of the probe's performance which can be quickly and easily compared with similar reports for other probes and with subsequent reports for the same probe. Results are available within 7-14 days of receipt of probe and order.

To give some idea of the cost of the service, the charge per test for probes meeting the following specifications would be £7.50:

Frequency	From ½ MHz to 20 MHz
Waterproof	or capable of being proofed with silicone grease.
Size	
Shear wave	<3.2 cm. wide, <2.5 cm. in front of and <3.6 cm. behind beam exit.
Compression	Cylindrical (or rectangular with cylindrical adaptor): length >1 cm., diameter from 1 cm. to 7.5 cm.
Cable entry	End; or side with adaptor if necessary.
Connectors	Corresponding to one of 11 given commercially available types.

Twin crystal probes can be tested in any of the following ways, at £7.50 per test:

crystal A as transmitter and crystal B as receiver;
crystal B as transmitter and crystal A as receiver;
crystal A as transmitter and receiver;
crystal B as transmitter and receiver.

The beams from the last two tests can, if required, be plotted simultaneously on the same chart at a cost of £20.

More information: Probe Testing Service, The Nondestructive Testing Centre, A.E.R.E., Harwell, Didcot, Berks. Tel: Abingdon 4141, ext. 2470.

NPL's New Grating-Ruling Machine

The National Physical Laboratory's Division of Inorganic and Metallic Structure has recently brought into operation a new grating-ruling machine. Designed and built at NPL, the machine scribes a series of very closely spaced straight and parallel lines on an aluminised glass blank with an extremely sharp diamond tool. Such a grating—a typical one may consist of 30,000 lines, 1.6 micrometres (1/1,600 inch) apart—splits up a beam of light into its constituent colours (wavelengths) and can hence be used in a spectrograph to analyse materials. The new NPL machine was designed primarily to produce X-ray gratings, which have a wide range of potential applications in such fields as electron-probe microanalysis, plasma physics, the study of thermonuclear reactions and X-ray astronomy. It is capable of ruling a range of pitches between 300 and 3,000 lines per mm, enabling gratings to be made with a variety of different characteristics, and, since it can rule both plane and concave gratings up to 100 mm. square, it is also suitable for producing optical gratings. Mechanical errors in gratings generally show up as 'ghost' lines superimposed on the spectrum. The NPL machine is controlled interferometrically to minimise such errors, and the ghost intensities do not exceed 1 part in 70,000 of that of the parent line measured in the first order at a wavelength of 633 nm. This figure indicates that the maximum periodic error in position of any line on the grating does not exceed 4 nm or about ten atomic diameters (4 nm. is less than 1/5,000,000 inch).

Because of the difficulties inherent in building and operating a machine to such a high degree of accuracy, no more than a dozen or so in the whole world have been able to produce gratings in any appreciable number. Most of the modern machines are interferometrically controlled, but the mechanical perfection required still makes them among the most precise machines made by man; the radical departure from convention of the NPL design, however, has reduced the necessity for extremely stringent mechanical tolerance and has enabled the machine to be made operational in a relatively short time.

More information: Materials Group Information and Planning Unit, National Physical Laboratory, Teddington, Middlesex TW11 0LW. Tel: 01-977 3222, ext. 34.

DTI's CAD Centre

CAD inspires novel knitted-fabric patterns

The hardware and software at DTI's Computer Aided Design Centre were used recently to provide what can only be called a source of inspiration for the designer of a new range of the ASORCA knitted fabrics marketed by the Andrew Seidner Organisation.

The designer used a program which presents a sequence of ever-varying patterns on a graphic display. Whenever a series of interesting patterns appeared, he was able to hold the display and then re-run the series over a one-minute cycle. If a pattern was deemed worthy of recording, a photograph was taken, and in this way the designer eventually emerged with a set of photographs. From the photographs, designs and graphs were worked out, and from these were derived a range of patterns with unique combinations of jacquards and mottled effects, suggestive of a scattered stitch.

A new high-speed data-transmission service

As part of its policy of continuous system development, the CAD Centre has recently introduced a high-speed remote-user data-transmission service suited to the characteristics of storage-tube graphic-display terminals. The Centre has commissioned a Modular 1 front-end system, which, in conjunction with the Post Office Datel 600 service, provides full duplex transmission at 1200/75 bits/s. Modular 1 offers communication channels for a variety of terminals (in addition to storage tubes, it is particularly suited to paper-tape transmission from teletypes), and the new service puts at the user's disposal the full interactive graphics facilities of the Centre's Atlas 2 computer and GINO software.

Users with storage-tube terminals currently working at 110 bits/s will need to have their equipment slightly modified before they can avail themselves of the new service, and they will also need to rent a Post Office modem No.1 Model 4 in place of their present Model 2. Speed of output at the terminal will, however, be increased tenfold.

More information: The Chief Consultant, Computer Aided Design Centre, Madingley Road, Cambridge CB3 0HB. Tel: Cambridge 63125.

British Calibration Service: Approved Laboratories

A ready-reference list of laboratories approved by the British Calibration Service to measure, to calibrate and to issue BCS Certificates of Calibration was published in *New Technology* Number 45 (April 1971), and this list was brought up to date in *New Technology* Numbers 49 (August 1971) and 52 (November 1971). Since then, the following additional laboratories have received BCS approval. The measurement category is given first, followed by the name of the laboratory, the address of the parent organisation, and the name and the telephone number of the head of the laboratory.

Electrical (dc and lf)
Electrical Standards Laboratory,
H. Tinsley and Co. Ltd.,
Werndee Hall,
South Norwood,
London SE25 5LA.

Mr. R. F. Spurr,
01-654 6046.

Electrical (dc and lf)
Standards and Calibration Laboratories (Electrical),
Instituto Nacional de Tecnica Aeroespacial,
'Esteban Terradas',
Torrejon de Ardoz,
Madrid, Spain.

Señor J. M. Balmisa,
22026 INTA E.

Pressure
Pressure Measurement Centre,
Sira Institute,
Instrument Performance and Standards Division,
South Hill,
Chislehurst,
Kent BR7 5EH.

Mr. J. S. Burton,
01-467 2636.

Temperature
Rosemount Calibration Laboratory,
Rosemount Engineering Co. Ltd.,
Durban Road,
Bognor Regis,
Sussex.

Mr. G. J. Thomas,
Bognor Regis 3121.

The following changes of name and/or address have been notified:

Pitter Gauge and Tool Calibration Laboratory has changed its name and address to:
Matrix Pitter Calibration Laboratory,
Coventry Gauge Ltd.,
Park Avenue,
Madeley,
Telford,
Shropshire TF7 5BP.

Mr. D. F. Willson,
Telford 585218.

Fine Limit Laboratory, W.B.J. Engineering Co. Ltd., has changed its address to:
The Fine Limit Works,
Shepley Industrial Estate,
Audenshaw,
Nr. Manchester.

Mr. Wm. Blackwell, Senior,
Denton 9411/2/3.

The Headquarters of the British Calibration Service has recently moved to the following address: British Calibration Service, Department of Trade and Industry, 26 Chapter Street, London SW1P 4NS. Tel: 01-834 7032.

Liverpool to Evaluate DTI Electric Bus

One of the Department of Trade and Industry's two prototype electric buses specially designed for city-centre use has been delivered, on loan, to the Merseyside Passenger Transport Executive, and after route-proving trials will be used on Liverpool's city circle route. The other prototype, currently in service in Leeds, will be tested over the next year in Bournemouth, Birmingham, Sheffield, Bolton and Glenrothes.

Designed to carry 26 passengers (9 seated, 17 standing, though other layouts can be accommodated to suit particular requirements), the bus, fully laden, has a range of about 35 miles per battery charge in city centre traffic, rising to 70 miles driven non-stop. Top speed on level ground is 20-25 mph, depending on load—adequate for most city-centre conditions. The bus's advantages—relative quietness, no fumes—should be realised to greatest effect in city centres, where exhaust pollution and noise are most keenly felt, and should be of particular value when the vehicles are operating in otherwise vehicle-free pedestrian areas.

The bus is fitted with instruments to record engineering and operating data, which will be used by manufacturers and users to assess the vehicle's characteristics. Designed on conventional electric-vehicle practice, and incorporating standard components where possible, it conforms to PSV regulations. Energy is provided by lead-acid traction batteries, propulsion is by a D.C. series-wound motor, driving through a conventional propeller shaft and differential to the back wheels, and speed is varied by a low-loss thyristor controller.

The bus is based on a British Leyland 900 FG chassis, and vehicle design and chassis modifications were carried out by Crompton Leyland Electricars, Tredegar, Mon. The body, which consists of aluminium and glass-reinforced plastic panels on a steel frame, is by Willowbrook of Loughborough. The batteries (Exide—220 v, 376 Ah at the 5-hour rate) are normally re-charged overnight or during rest periods during the day. The complete set of batteries can, however, be rapidly replaced by a new set to extend the daily mileage. The battery charger provided with the vehicle is manufactured by Legg Industries. The bus is 22 ft. long, 8 ft. 0½ in. wide, and 9 ft. 6 in. high overall (6 ft. 3 in. high in the saloon), and weighs 9¾ tons fully laden and 8 tons unladen.

Enquiries regarding the loan of the vehicle for evaluation are invited from Public Service Vehicle Operators. They should be addressed to Vehicles and Mechanical Engineering Products Division, Department of Trade and Industry, Room 729, Abell House, John Islip Street, London SW1.

news

Appreciation course and study tour on the uses of plywood and blockboard

The UK will be host for the Timber Committee of the Economic Commission for Europe at an appreciation course and study tour on the uses of plywood and blockboard which is being held from September 10 to 20, 1972. The course will take place at the Imperial College of Science and Technology, London, from September 10 to 15; the study tour—attendance at which is optional—will take up the rest of the time. More information and application forms from: Mr. P. Thompson, DTI, Room 1920, Millbank Tower, Millbank, London SW1P 4QU. (Tel: 01-834 2255, ext. 258).

International Atomic Energy Agency meetings

DETAILS of the following Meetings are now available from DTI:

Symposium on Neutron Monitoring for Radiation Protection Purposes. December 11-15, 1972, Vienna.

This symposium will facilitate discussions on current problems among the radiation-protection specialists, with emphasis on detectors, instruments and techniques. Topics: general considerations; instruments and techniques; measuring devices; monitoring devices and systems; interpretation of measurements; standardisation and calibration.

Symposium on Nuclear Power Plant Control and Instrumentation, January 22-26, 1973, Prague.

The symposium will emphasise problem areas and recent experience in the design, operation and maintenance of control and instrumentation systems, including relevant aspects of safety and economy. Topics: nuclear and process instrumentation, design, reliability and economic considerations; application of experience gained from operating nuclear power plants; on-line computer applications and related operational, reliability and safety considerations; engineering standards for control and safety systems; considerations of quality control; installation testing and in-service inspections; potential failure detection.

Symposium on New Developments in Radiopharmaceuticals and Labelled Compounds. March, 26-30, 1973 Copenhagen.

The symposium will summarise the rapidly moving developments in the field of nuclear medicine, and attempt to provide a coherent picture of the directions now being taken by researchers in radiopharmaceuticals and labelled chemicals. Topics: nuclide generators; kits for preparing radiopharmaceuticals from short-lived isotopes; accelerator production of medically useful isotopes; synthesis of radiopharmaceuticals and labelled compounds from short-lived isotopes; labelled compounds for *in vitro* clinical diagnostic procedures; stable isotopes in medicine; regulatory and pharmaceutical responsibilities for radiopharmaceuticals.

For these symposia only nominations submitted through DTI will be accepted by the IAEA. More information: Mr. T. Abott, Department of Trade and Industry Millbank Tower, Millbank, London SW1P 4QU. Tel: 01-834 2255, ext. 280.

British product reliability

A UNIQUE opportunity to emphasise the importance of British Product Reliability in the expanding European Market will be provided by a one-day Conference which is being held, under the aegis of the Department of Trade and Industry (Northern Region), the Institution of Production Engineers and the Tyneside Productivity Association, on Thursday, October 19, 1972, in the Gosforth Park Hotel, Newcastle upon Tyne. Eminent speakers will present papers dealing with the requirements of the European Market, the establishment of reliability, the place of inspection in the manufacturing function and the contribution of packaging in maintaining reliability. More information from the Secretary, Tyneside Productivity Association. Exchange Buildings, Quayside, Newcastle upon Tyne NE1 3BJ.

Responsibility for engineering quality

Responsibility for quality lies firmly at the door of top management, which must operate a firm policy of coherence and co-operation between the specialist sections to execute that responsibility. So runs the motif linking the eight sessions of the *12th Quality Assurance Conference* which the Institution of Engineering Inspection is holding at New College, Oxford, from 25 to 28 September, 1972. Topics covered: determination of standards for quality levels; budgeting for the determined standard; choosing the right materials; choosing the right process; maintenance of production facilities; calibration; modern measurement as an aid to quality assurance; contractual aspects of quality. More information: Conference Secretary, the Institution of Engineering Inspection, 146 Cromwell Road, London SW7 4EF. Tel: 01-370 6981.

NDT '72

'NDT '72', the Ninth Annual Conference and Exhibition of the Non-Destructive Testing Society of Great Britain, will take place on September 12-15, 1972, at Loughborough University of Technology, Leicestershire. The largest annual event in the UK devoted to the subject of non-destructive testing, NDT '72 is being organised in association with the German Society for Non-Destructive Testing. The subjects covered will include: fundamental problems in the application of non-destructive testing; education in non-destructive testing; eddy-current testing; ultrasonic-testing methods; new techniques; imaging methods; non-destructive testing in the aerospace industry; revision course on magnetic and penetrant testing. More information: The Secretary, The Non-Destructive Testing Society of Great Britain, Maitland House, Warrior Square, Southend-on-Sea, Essex SS1 2JY. Tel: 0702-610131.

The computer and production engineering

More Success from Your Computer is the theme of the Summer School which the Institution of Production Engineers is holding at Birmingham University from July 18 to 21. This theme will be developed in lectures and exercises reviewing data-processing techniques; illustrating how companies can make better use of existing routine data in such fields as product design and process planning, plant layout and materials handling, and production planning and control; and demonstrating how additional data can be used in the investigation of particular production-engineering problems. Directed mainly at middle management in line and staff roles, the School ranks as training for the purposes of general grant from the Engineering Industry Training Board. More information: Conference Secretary, 146 Cromwell Road, London SW7 4EF. Tel: 01-370 6981.

'Privacy, Computers and You'

IN November 1970, the National Council for Civil Liberties set up a workshop on the 'data bank society'. The formal sessions and discussions have now been analysed, and edited into an NCC publication—*Privacy, Computers and You*—obtainable (price £3) from bookshops or NCC Publications, Quay House, Quay Street, Manchester M3 3HU. Among the subjects studied were: privacy in a technological society; the North American experience; the use of data banks; computers and employment; the legal problem; and the problem for the computer professional. Discussion of these subjects revealed that a threat to privacy could exist, but that the necessary legal, technical and ethical safeguards are within reach. The detailed working sessions did much to clarify what these safeguards should be and to lay foundations for a movement towards them.

Processors and post-processors for n.c. machine tools

THE Machine Tool Industry Research Association has produced a new edition of its list of available post-processors for n.c. machine tools first published in 1969. The lists include brief details of the important features and availability of 39 processor programs and 350 post-processor programs. The new edition has been compiled with the co-operation of makers and users of machine tools, computer manufacturers, computer bureaux and research and development organisations. It is expected to prove particularly useful in preventing duplication of effort and in facilitating the wider use of existing processor and post-processor programs. The M.T.I.R.A. list of processors and post-processors costs £10 (inclusive of postage and packing) from M.T.I.R.A., Hulley Road, Macclesfield, Cheshire SK10 2NE. Tel: Macclesfield 5421.

Metrication: a bibliography

Metrication Bibliography, a booklet designed to help those in industry who are involved in changing over to the metric system, is now available (price 40p) from the Technology Reports Centre, St. Mary Cray, Orpington, Kent BR5 3RF. Compiled by the Department of Trade and Industry with the assistance of the Metrication Board, it lists (with brief summaries of contents) metrication reference books and other publications covering various branches of industry. It also gives details of films available.

More information: Where possible, items in *New Technology* indicate the best sources of further information. Readers are advised also to seek information on matters relating to *New Technology* from the following DTI regional offices: Edinburgh, 031-225 1822; Cardiff 62131; Newcastle upon Tyne 27575; Manchester, 061-832 9111; Leeds 38232; Nottingham 46121; Birmingham, 021-643 8221; Bristol 21071; London and South East, 01-684 9781; Eastern, 01-828 4355. In Northern Ireland, information is given by the Dept. of Industrial and Forensic Science, Belfast 21722.

Editorial Office: Department of Trade and Industry, Room 439, 1 Victoria Street, London SW1H 0ET. Tel: 01-222 7877, ext. 2620.

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